

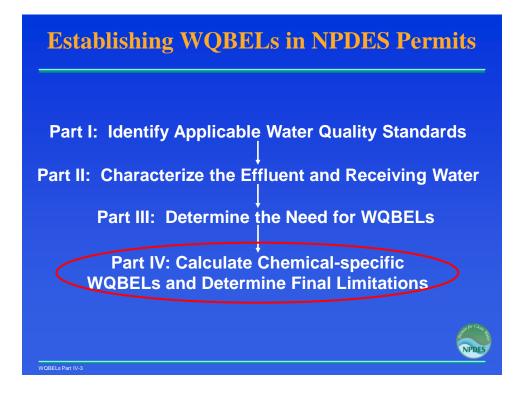
## **Today's Speakers**

- David Hair
  Environmental Engineer
  US Environmental Protection Agency
  Washington, DC
- Greg Currey
   Environmental Engineer

  Tetra Tech, Incorporated
  Fairfax, Virginia



WOREL & Part IV-



# Part I Review: Relationship Between WQS and Effluent Limitations

- Recall from Part I (Identify Applicable WQS):
  - Water quality standards apply throughout the waterbody (or segment of a waterbody) as defined by the state, territory, or tribe
  - Effluent limitations apply at the compliance point established in the permit (generally "end of pipe")



#### Part I Review: WQS Implementation Procedures

- Water quality standards and their implementing procedures (including NPDES requirements) specify methods for determining the need for WQBELs and for calculating WQBELs that ensure that standards are attained.
- Where can these methods be found?
  - EPA's Technical Support Document
  - state regulations
  - state water quality management plans
  - state guidance
  - past practices
  - We never thought about this before!



WQBELs Part IV-5

#### Part II Review: Step 1—Identify Pollutants of Concern

Recall from Part II (Characterize Effluent and Receiving Water) that pollutants of concern are pollutants:

- With an applicable technology-based effluent limitation (TBEL)
- With a wasteload allocation (WLA) from a total maximum daily load (TMDL)
- Identified as needing WQBELs in the previous permit
- Identified as present in the effluent through monitoring
- Otherwise expected to be present in the discharge

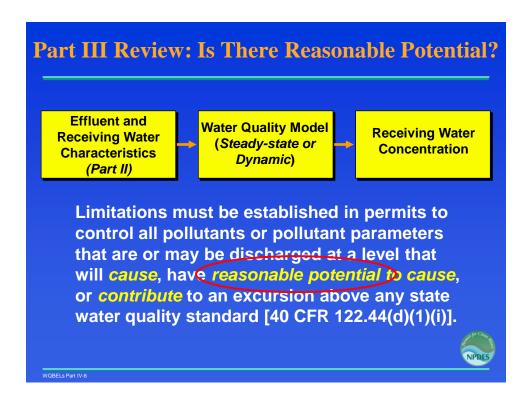


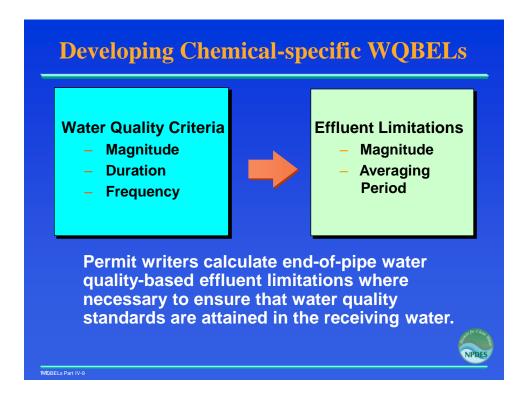


# Part II Review: Step 2—Determine the Allowable Dilution or Mixing Zone in the Receiving Water

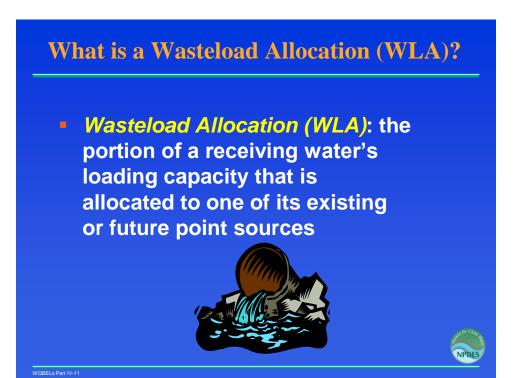
Also recall from Part II (Characterize Effluent and Receiving Water) that we need to:

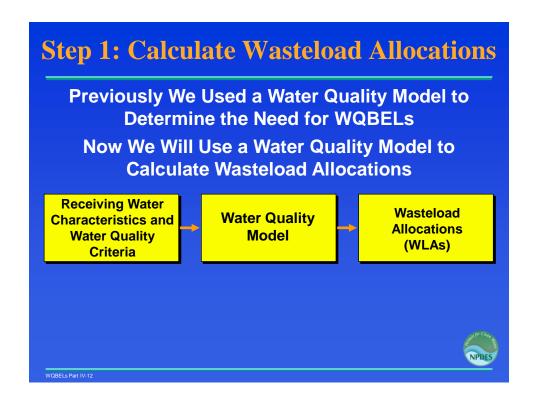
- Determine whether water quality standards permit dilution allowances or mixing zones
- Determine critical conditions (e.g., critical stream flow)
- Determine type of mixing under critical conditions
  - Rapid and complete mixing
  - Incomplete mixing
- Determine dilution allowance or regulatory mixing zone size for calculations

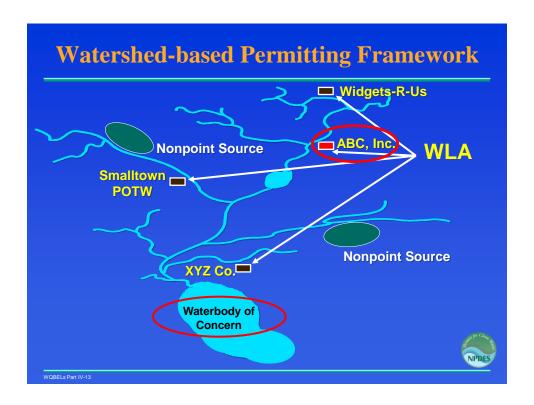


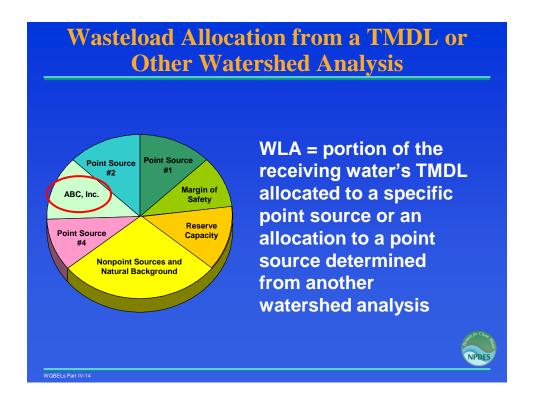


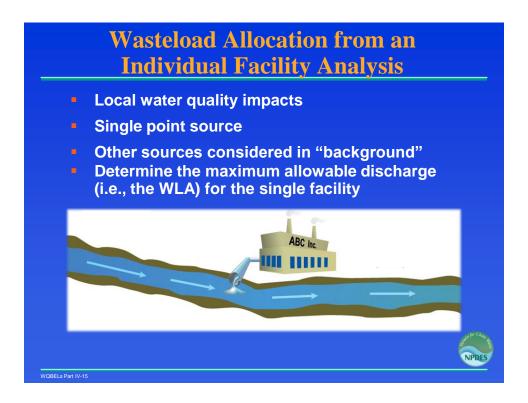


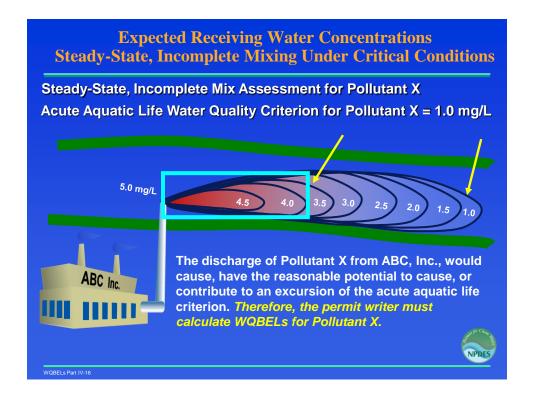


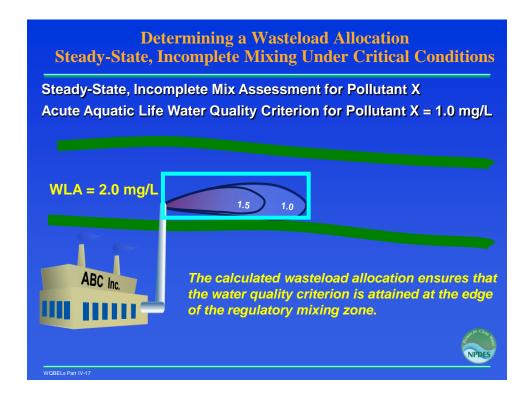


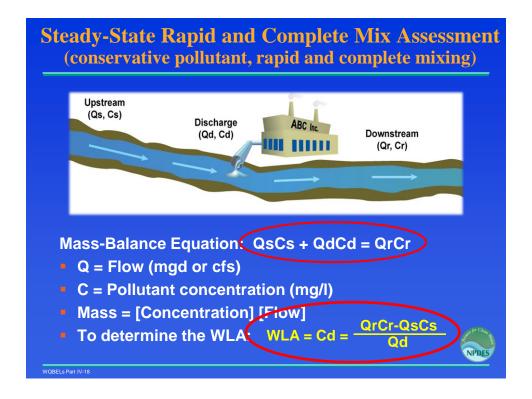


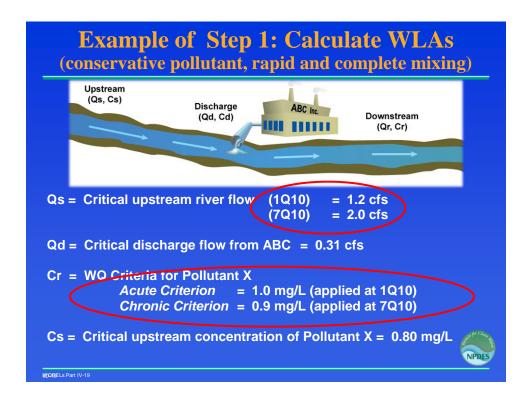


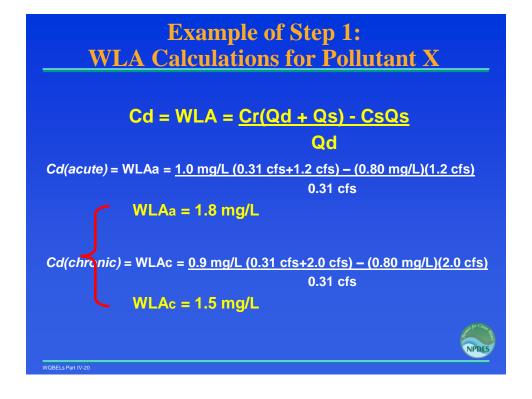


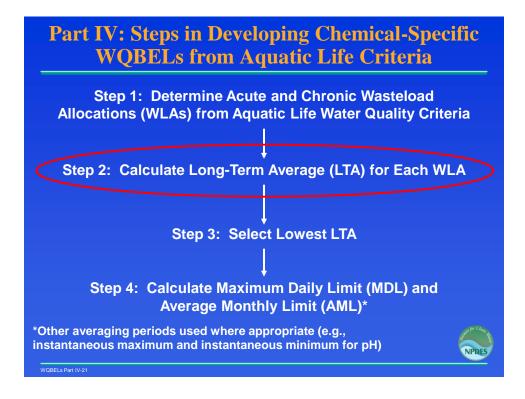








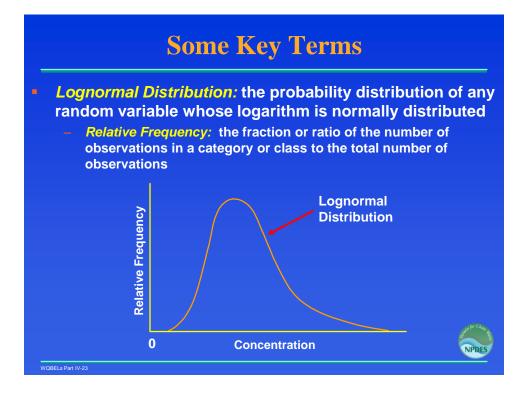




### Need a Common Statistical Basis for Comparison

- WLAa typically expressed as 1-day average (treated as a 1-day average in calculations)
- WLAc typically expressed as 4-day average
- Calculating an LTA from each WLA establishes common statistical basis and allows direct comparison





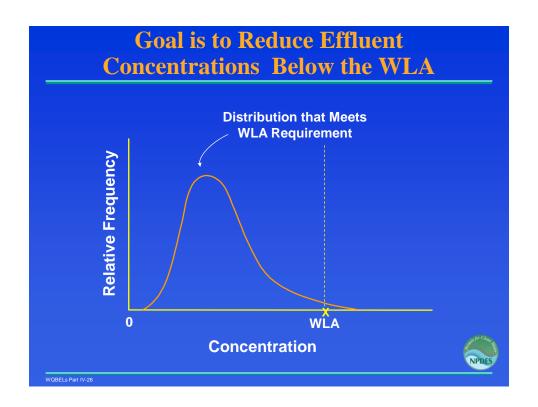
### **Some Key Terms**

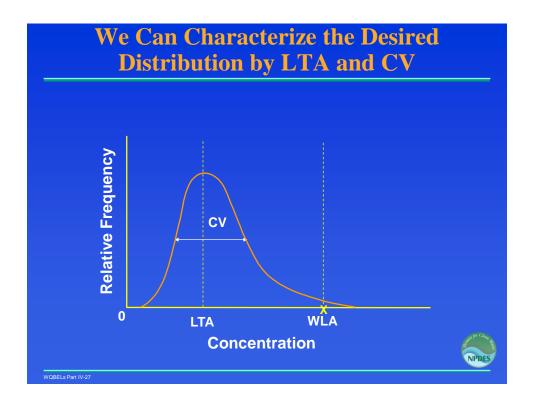
- Long-term Average (LTA): mean concentration of the pollutant or pollutant parameter
- Coefficient of Variation (CV): a statistical measure of the relative variation of a distribution or set of data (in our case, pollutant concentrations) calculated as the standard deviation divided by the mean

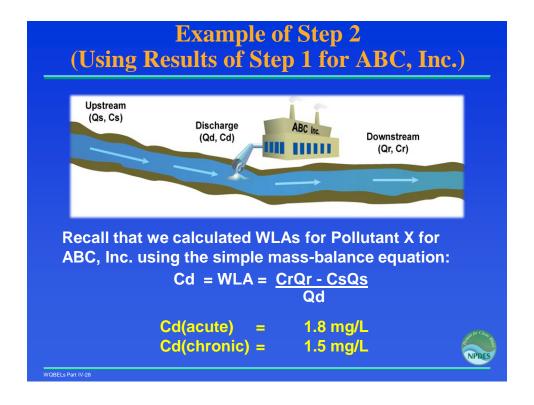
### **Step 2: Calculate LTAs**

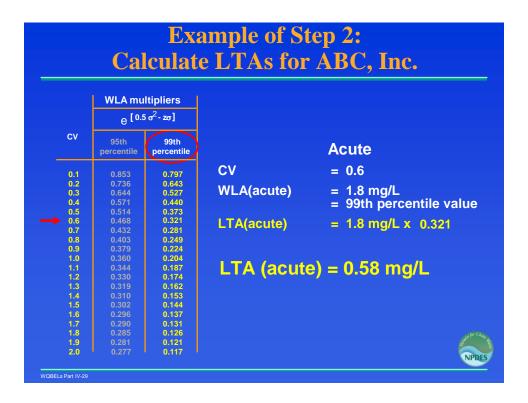
- Assume a lognormal distribution of effluent data
- WLA is never to be exceeded
- Characterize never to be exceeded by an upper bound value (e.g., WLA is the 99th percentile concentration on the lognormal effluent distribution)
- Knowing the WLAs and a (coefficient of variation) CV, calculate the LTA corresponding to each WLA

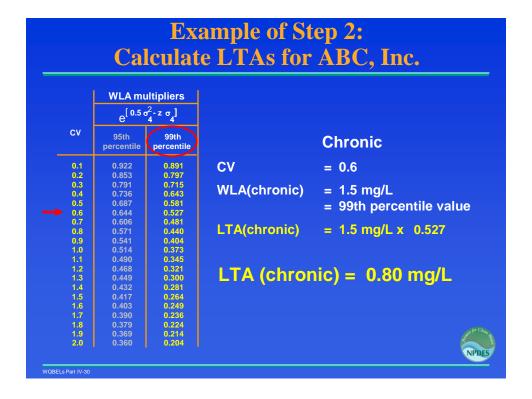


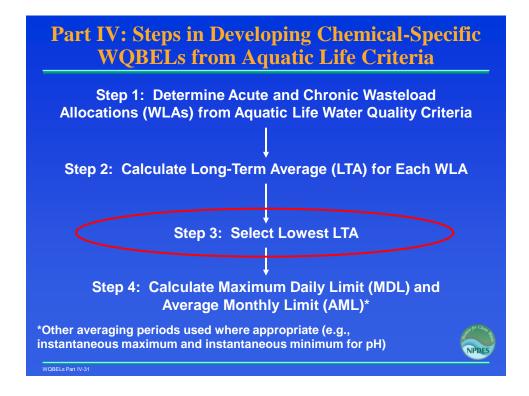










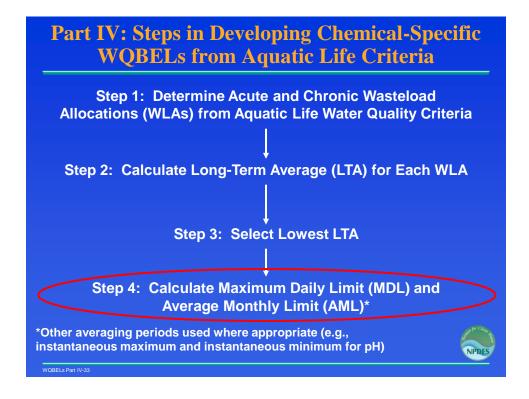


# **Example of Step 3: Select Lowest LTA for ABC, Inc.**

#### For ABC, Inc.:

- LTA(acute) = 0.58 mg/L
- LTA(chronic) = 0.80 mg/L
- **0.58 < 0.80**
- Select LTA(acute) = 0.58 mg/L
  as the basis for WQBELs

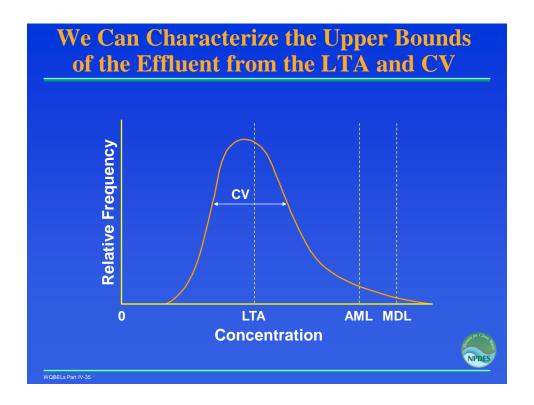


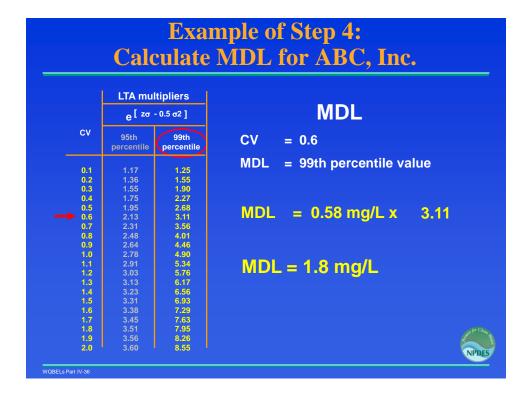


## **Step 4: Calculate MDL and AML**

- Use the lognormal distribution to calculate the MDL and AML from the lowest LTA:
  - Uses upper-bound estimates for both MDL and AML
  - Ties AML to planned frequency of monitoring
  - Allows comparison to technologybased limits







CV	LTA multipliers e [zơn-0.5ơn²]									AML	
											95th percentile
	n=1		_		n=30			_		n=30	(assume twice- weekly sampling)
0.1 0.2	1.17	1.12	1.08	1.06	1.03	1.25 1.56	1.18	1.12	1.08	1.04 1.08	CV = 0.0
0.2	1.55	1.38	1.17	1.18	1.09	1.90	1.59			1.13	AML = 95th percentile val
0.4	1.75	1.52	1.36	1.25	1.12	2.27	1.83	1.55	1.37	1.18	AME = 30th percentale val
0.5	1.96	1.66	1.45	1.31	1.16	2.68	2.09	1.72	1.48	1.23	
0.6	2.13	1.90	1.55	1.38	1.19	3.11	2.37	1.90	1.59	1.28	
0.7	2.31	1.94	1.65	1.45	1.22	3.56	2.66	2.08	1.71	1.33	ABIL 0.50 mm/l m 4.00
8.0	2.48	2.07	1.75	1.52	1.26	4.01	2.96	2.27	1.83	1.39	AML = 0.58  mg/L x  1.38
0.9	2.64	2.20	1.85	1.59	1.29	4.46	3.28	2.48	1.96	1.44	The second s
1.0	2.78	2.33	1.95	1.66	1.33	4.90	3.59	2.68	2.09	1.50	
1.1	2.91	2.45	2.04	1.73	1.36	5.34	3.91	2.90	2.23	1.56	A D A D A D A D A D A D A D A D A D A D
1.2	3.03	2.56	2.13	1.80	1.39	5.76		3.11	2.37	1.62	AML = 0.80  mg/L
1.3 1.4	3.13	2.67	2.23	1.87	1.43	6.17 6.56	4.55 4.86	3.34	2.52	1.68 1.74	
1.4	3.23	2.77		2.00	1.47	6.93	5.17	3.56	2.66	1.74	
1.6	3.38		2.40	2.00	1.54	7.29	5.17	4.01	2.96	1.87	
1.7	3.45	3.03	2.56	2.14	1.57	7.63	5.77	4.01	3.12	1.93	
1.8	3.51	3.10	2.64	2.20	1.61	7.95	6.06	4.46	3.28	2.00	
1.9		3.17	2 71		1.64	8.26				2.07	
1.9 2.0	3.56 3.60	3.17	2.71	2.27			6.34	4.68 4.90	3.43	2.07 2.14	A CONTRACTOR OF THE CONTRACTOR

# Calculated WQBELs for ABC, Inc.

We calculated the following WQBELs for Pollutant X at ABC, Inc.:

MDL = 1.8 mg/L

AML = 0.80 mg/L

Are these the final effluent limitations?



# Final Check

- Compare:
  - WQBELs based on individual facility WLAs with
  - TBELs or other existing limitations with
  - WQBELs based on a TMDL or other watershedbased requirements
- The most stringent limitations for each parameter are the new, calculated final effluent limitations for that parameter
- Final effluent limitations in the permit must meet antidegradation and anti-backsliding requirements



WQBELs Part IV-39

#### **Document All Decisions**

- Be sure to document in the fact sheet or statement of basis:
  - Statutory and regulatory citations
  - The process used to determine the need for WQBELs and to calculate wasteload allocations including:
    - Selected water quality model
    - Critical conditions
    - Dilution allowance or mixing zone
  - The process used to calculate water quality-based effluent limitations (including showing calculations)
    - Any antidegradation analysis or anti-backsliding analysis conducted and the basis for resulting decisions



NPDES

# ARE YOU READY FOR A SHORT QUIZ?

NPDES

WQBELs Part IV-4

Articulate Quizmaker Quiz Placeholder - Quiz\_WQBELs Part IV

1017.8

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- To print a certificate of completion for this module, click on the button below to open the certificate, fill in your name where indicated, then click on the grey button labeled "Click Here to Print Certificate"
- If you wish, you may notify EPA that you have completed this module by filling in your affiliation and clicking on the grey button labeled "Click Here to Submit Completion Info by Email"
  - Note: Any information provided to EPA will be available without restriction
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WQBELs Part IV-43

#### **Feedback and Other Presentations**

**Questions or comments?** 

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